Know the Earth…Show the Way

InnoVision Future Warfare Systems Office

Laying the Geospatial-Intelligence Foundation for Future Warfare

Brief to Precision Strike Program Review

Jon D. Estridge
Chief, Air Warfare/Targeting Division
NGA Future Warfare Systems (IW)
InnoVision Directorate

What is NGA and What Do We Do?

Our vision…

Know the Earth…Show the Way

…D/NGA as the functional manager for GEOINT:

Department Of Defense Directive Number 5105.60 (dated 11 October 1996)

…Providing **GEOINT** in all its forms, and from whatever source imagery and geospatial– to **ensure** the **knowledge foundation** for planning, decision, and action.

…Affording **easy access** to GEOINT data, for **all stakeholders**.

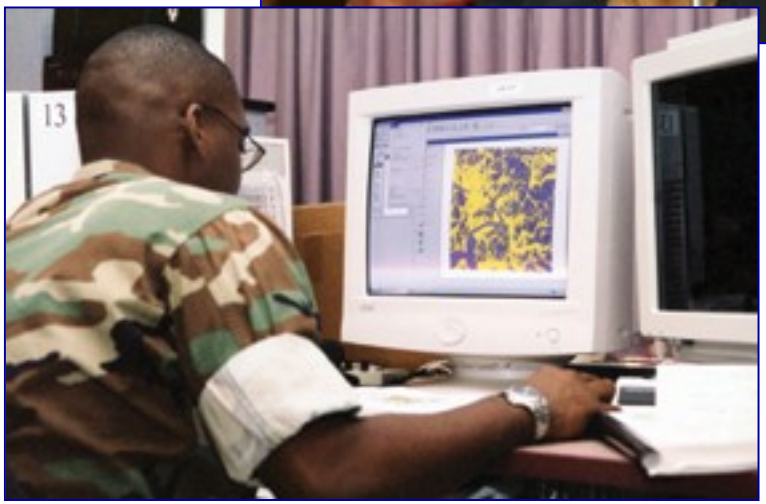
…Creating **tailored, customer-specific** GEOINT; providing analytic **services** and **solutions**; and **sharing insight**.

Our Contribution to National Security

Geospatial Intelligenc edge basis for decision, planning, an

Geospatial Intelligence: Who are its customers?

- National policymakers
- Combatant commanders
- Homeland Security agencies
- Intelligence Community analysts
- **Military Departments (Services) - -** Title 10



What is NGA and What Do We Do?

National Geospatial-Intelligence Agency (NGA) is a National Intelligence and Combat Support Agency

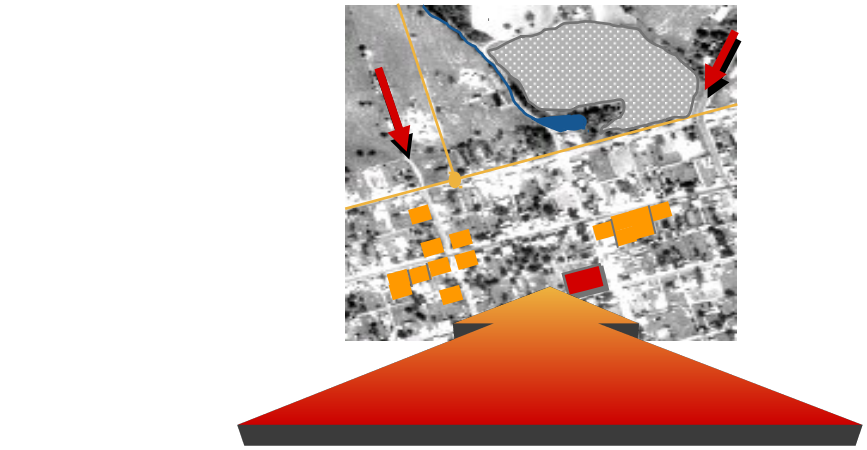
Mission:

Provide Timely, Relevant, and Accurate GEOINT in support of National Security

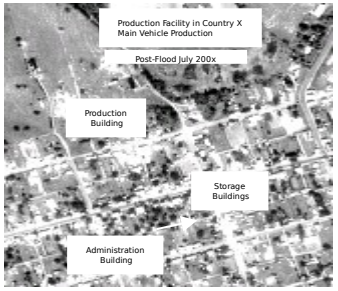
Definition:

GEOINT is earth-referenced information about natural and man-made objects or events with National Security implications

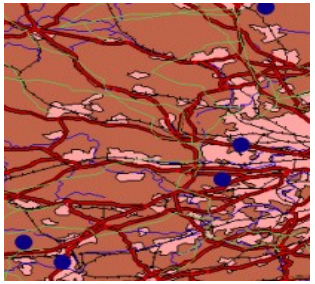
GEOINT



Imagery



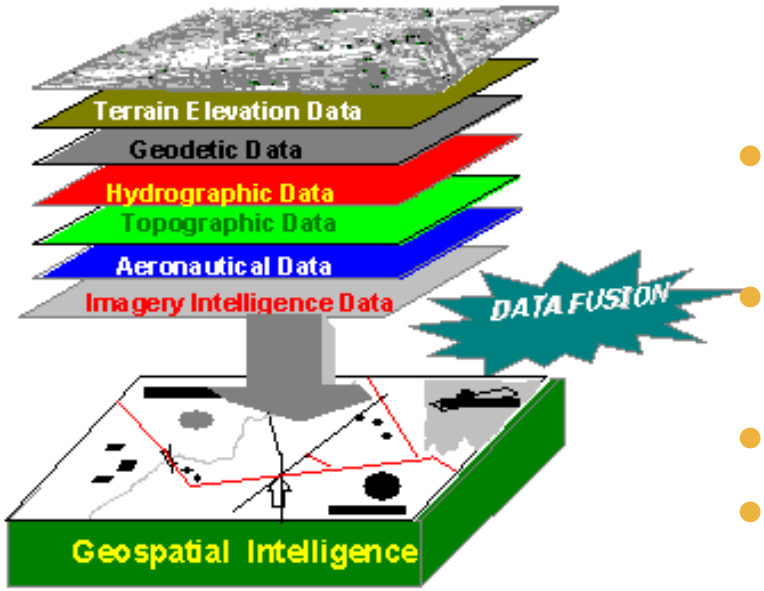
Imagery Intelligence



Geospatial Information

Geospatial Intelligence (GEOINT)

- **A 4-D framework of information for comprehending objects and events, planning and executing operations, and assessing effects**



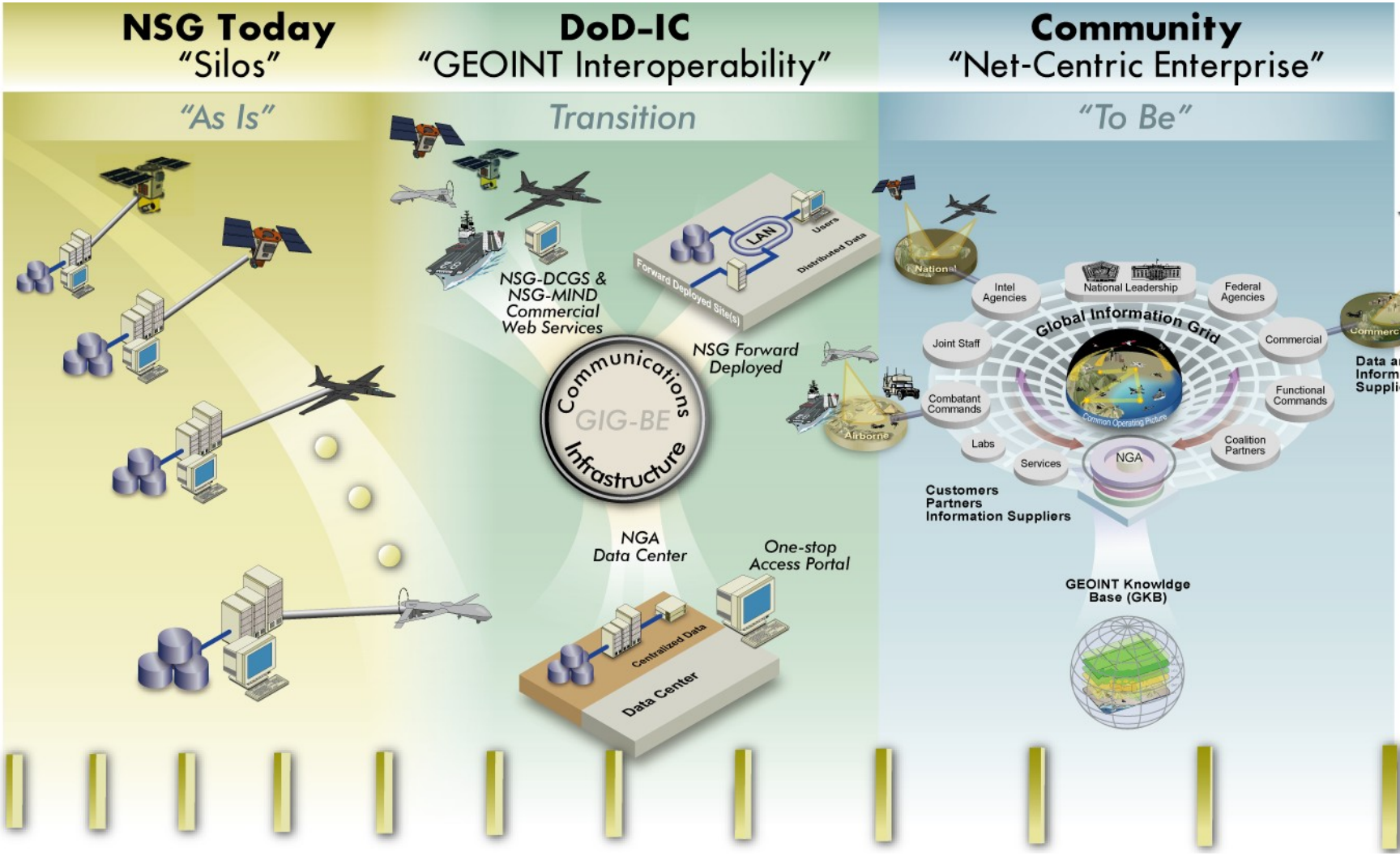
- *How are the enemy's physical and virtual infrastructures constructed? …*
- *How do they interrelate and operate?…*
- *What are my COA options and COEs?…*
- *Where am I?…*
- *Where are the Friendlies?… Hostiles?… Non-Combatants?…*
- *How do I move or navigate in the battlespace?…*
- *What is the environment?…*

GEOINT Provides the Basic Foundation for Effects-Based Operations

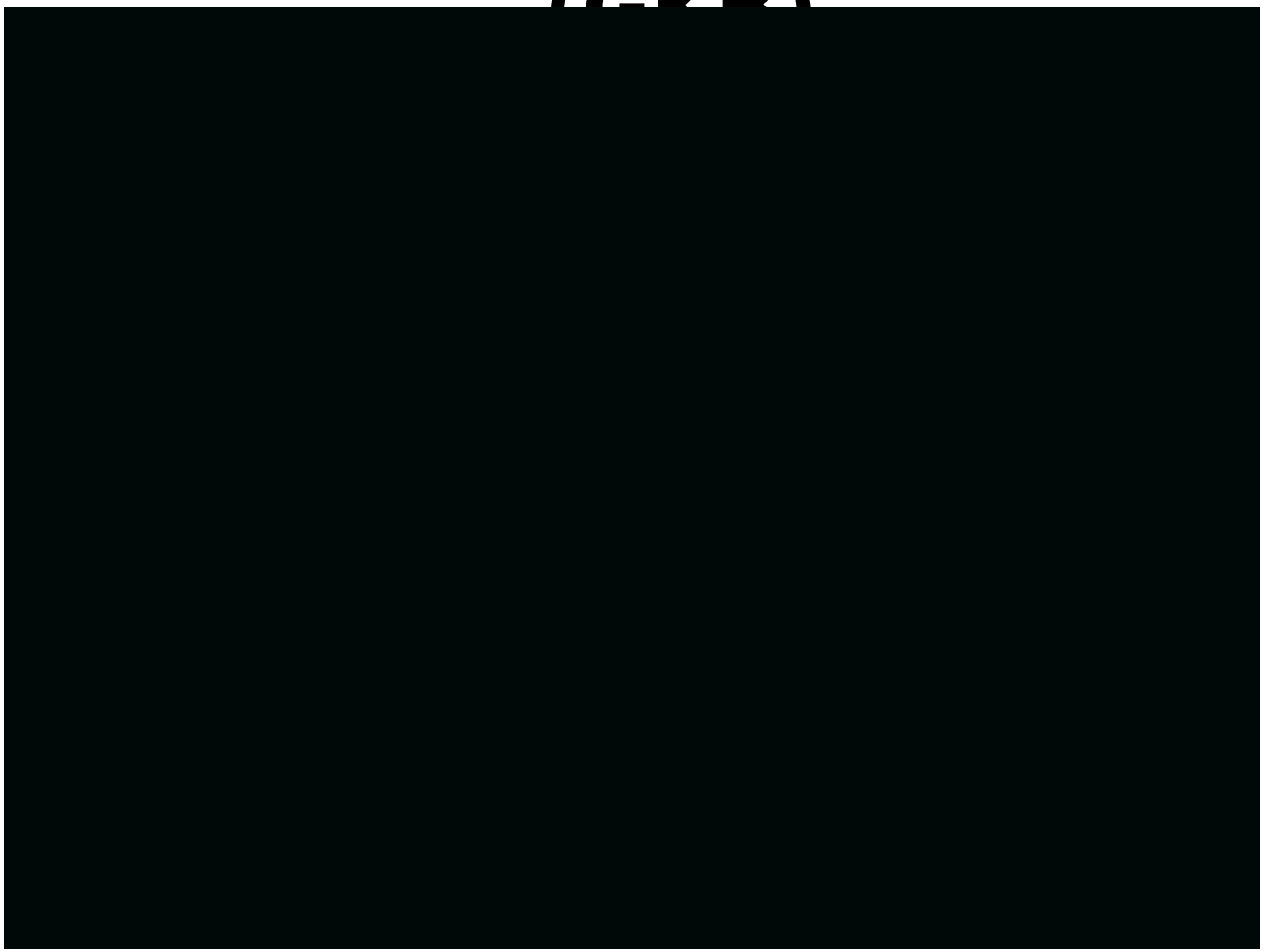
Key Elements of NGA Transformation

- All-digital Operating Environment – transition from a paper-centric to a layered, data-rich network-centric environment accessed via single portal
- Foundation Data –Specific information on essential features that change rarely or slowly (i.e., point positioning data, topographic features, elevation data, safety of navigation)
- Mission Specific Data –Intensified Foundation Data encompassing greater detail or additional features and/or attributes to meet specific mission requirements
- Geospatial-Intelligence Knowledge Base (GKB) –NGA data environment composed of two content layers: foundation layer and intelligence layer (weather, order of battle, intelligence reports, features, multi-intelligence, elevation)

The Transition

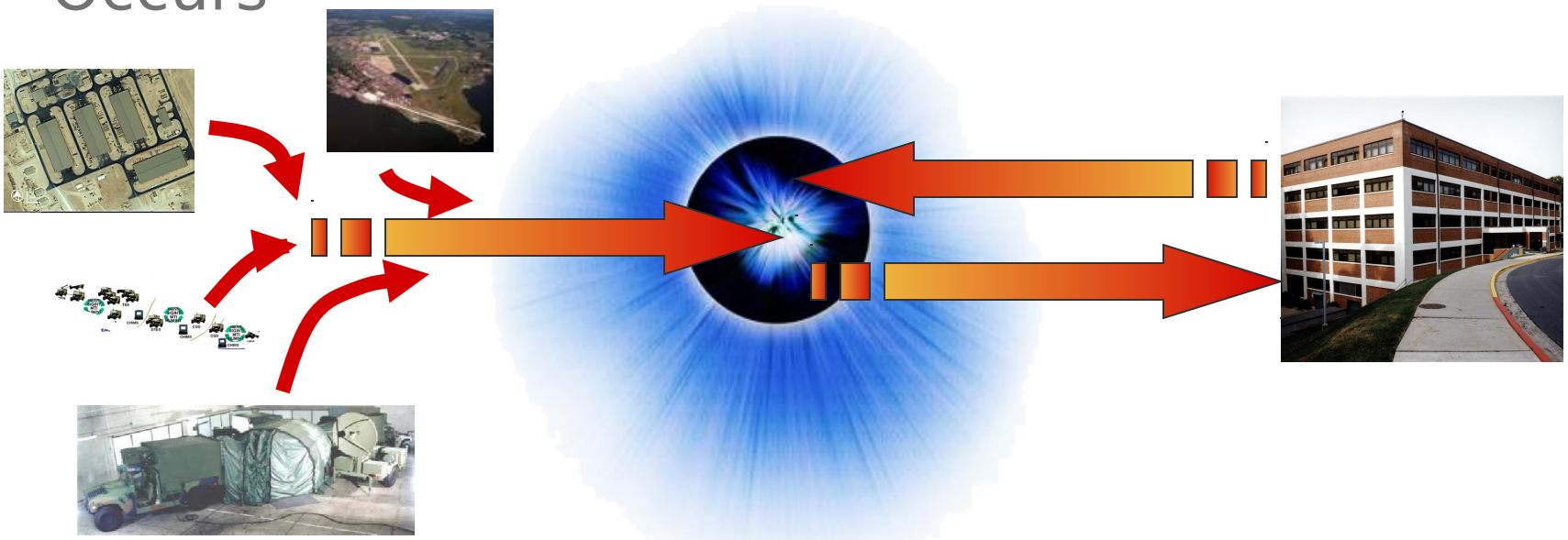


Geospatial Intelligence Knowledge Base (GKB)



Customer Self-Serve Portal

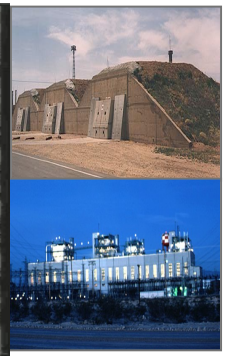
- Provides Stakeholders with One-Stop Access to All of NGA's Holdings
- Means Through which Web-Based Collaboration Occurs



The Changing Challenge….

Above Surface

Stationary → ***Moving***



12 - 24 Hours

4 - 12 Hours

0 - 4 Hours

Traditional NTM Coverage

Denial and Deception

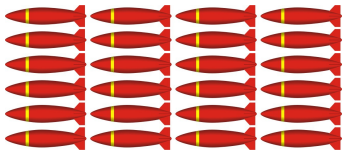
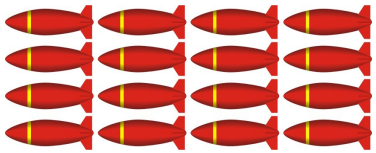
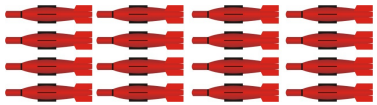
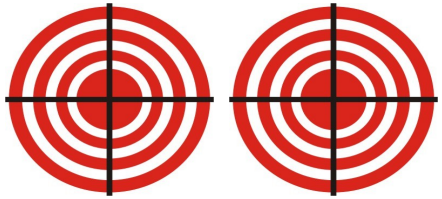
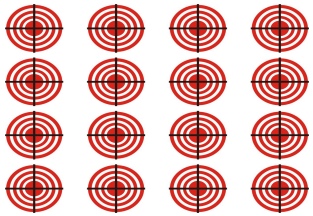
Below Surface

Characterized

Uncharacterized

What is GEOINT and Why is it Important?

A short picture history of the impact of GEOINT

1943	1970	1991	2005	2010
				
1500 B-17 sorties **9000 x 250 lb. bombs** One 60’ x 100’ target W.W. II	**30 F- 4 sorties** **176 x 500 lb. bombs** One Target Vietnam	**1 F-117 sortie** **2 x 2000 lb. bombs** Two Targets per Sortie Desert Storm	**1 B-2 sortie** **16 x 2000 lb. bombs** 16 Targets per Pass Available Today	**1 FA-22 sortie** **8 x Small Diameter Bombs** Future Weapon Attacks Mobile Targets
				**ONE SHOT** **ONE KILL**

Weapon Performance: Precision & Accuracy

It's always a matter of precision AND accuracy:

Precision, Without Accuracy

Accuracy, Without Precision

Accuracy, With Precision

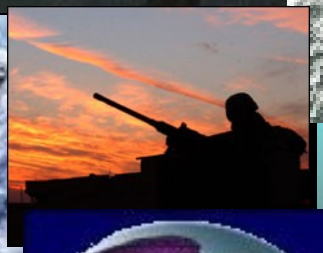
- Both matter if you're shooting a weapon at a coordinate!
  - Latitude: 350342.**791**N
  - Longitude: 1072256.**017**E
  - Height above Ellipsoid: 529.**38**m
  - Circular Error/Linear Error **90** = **4.1**m/**3.8**m

Precision

Accuracy

- In and of themselves, PGMs are not inherently any more accurate than any other type of weapon; but, their behaviors are more predictable and controllable
- The focus must be on our ability to achieve a delivery accuracy commensurate with our ability to achieve precision trajectory control

Future Warfare Systems Office

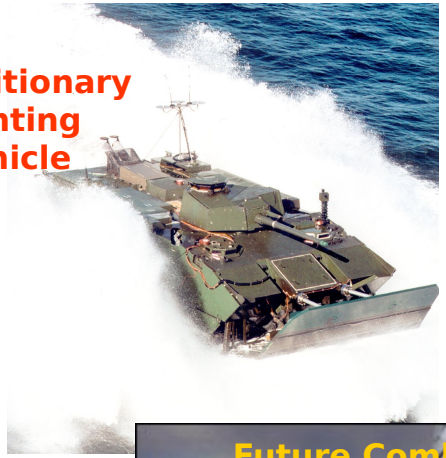


Future Warfare Systems Office (IW)

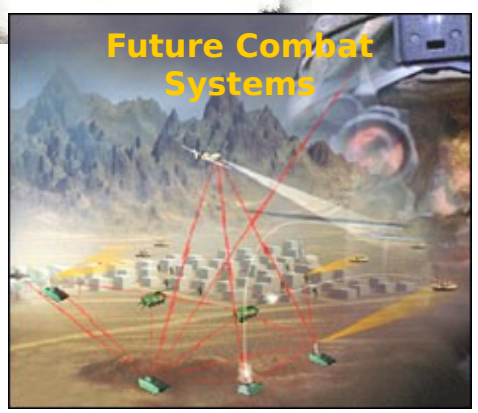
Mission

- **Identify** and meet DoD and Military Service needs for Geospatial Intelligence for **emerging and future warfare systems** to ensure their desired effectiveness
- When necessary, facilitate **technical**, **operational**, or **programmatic solutions** to eliminate shortfalls

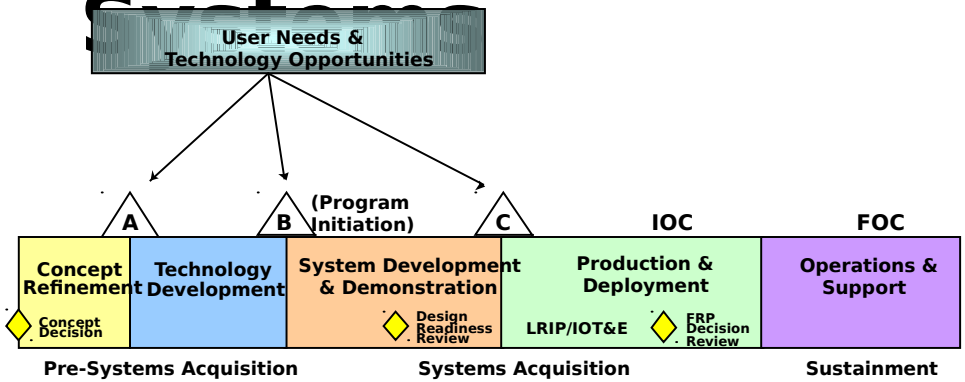
The Idea

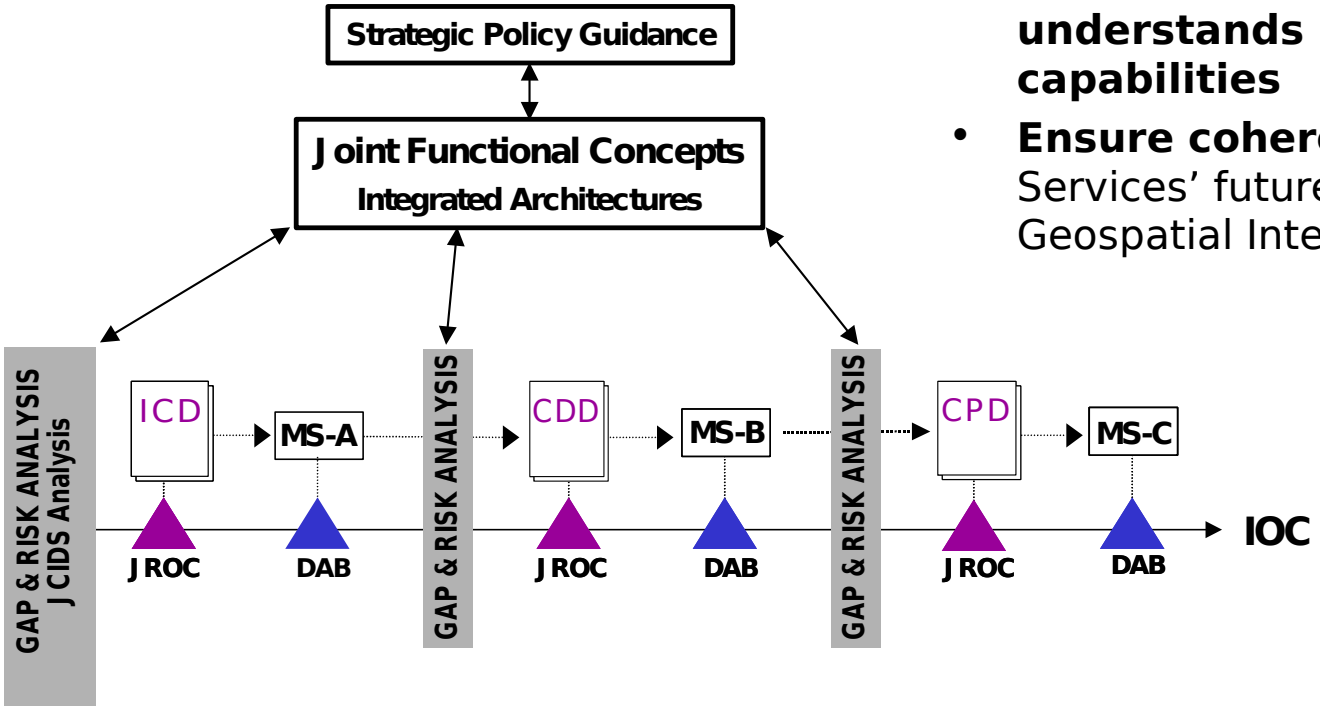


- Introduced by General Clapper
  - **Warfare systems** of the future will **increasingly depend on the information** provided by NGA
  - NGA must be **part of the process** and **fully engaged from the inception** of acquisition programs
  - GEOINT **cannot be an afterthought**



NGA's Focus on Future Warfare Systems





- **Interface early** in acquisition cycle
- Participate as a **special member to the DAB**
  - Attend IIPTs, OIPTs
- Ensure NGA **understands *specific* Geospatial Intelligence** needs of future warfare systems
- Ensure Warfare Community **understands NGA's planned capabilities**
- **Ensure coherence** between Services' future systems and NGA's Geospatial Intelligence

Goals . . . and Benefits

NGA/IW's Goals

- Understand Future Warfare System GEOINT Needs
- Educate Warfare System Stakeholders on NGA's Transformation Goals and Initiatives
- Identify GEOINT Support "Disconnects" Early in Warfare System's Development
- Inform NGA transformation

Potential Benefits – for Warfare Programs and NGA

- Lower technical and cost risk
  - For future MDAP systems
  - For the National System for Geospatial-Intelligence (NSG)
- Increased NGA Responsiveness
- Optimized Warfare System Performance
- Better Informed Budget Priorities and Decisions
- Better Technology Investments
- More Focused NGA Transformation

IW Program Alignment

Scott Robertson, A. Director

John Powers, A. Deputy
Amy Wandless, BX
Randy Anders, A. TX

OSD Liaisons

USD(I)
USD(AT&L)

Key Programs and Initiatives

AIR/SPACE/TGT

- F/A-22 & F-35
- JUCAS
- SDB
- AOC
- JMPS
- AMD
- PAC 3/MEADS
- CV-22

LAND/SpecOps

- FCS
- EFV
- NLOS
- Soldier System
- PRV
- Complex Terrain
- Special Ops Support
- Rotary Wing A/C

NAVAL

- LCS
- DD (X)
- JHSV
- ASDS
- ERGM
- VXX
- MMA
- ASW ConOps

C4ISR

- ACS
- JBMC2
- DJC2
- DCGS
- WIN-T
- JTRS
- JLENS

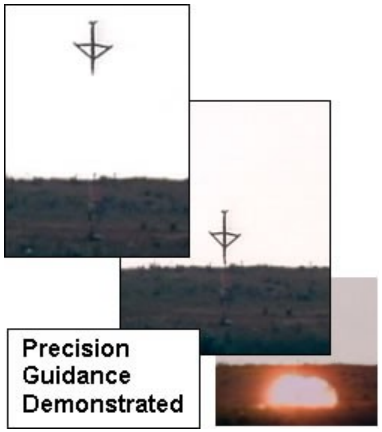
Air Warfare Future Systems

- F/A-22, F-35 (Joint Strike Fighter)
  - Next generation fighter aircraft
  - Extremely robust radar and sensor suite (direct targeting)
  - JSF developing “digital cockpit” with leap ahead technologies
  - Non Traditional ISR – IW authored early draft CONOPS, adopted by Air Combat Command (ACC) as baseline for USAF document
  - Early program spirals focused on air worthiness

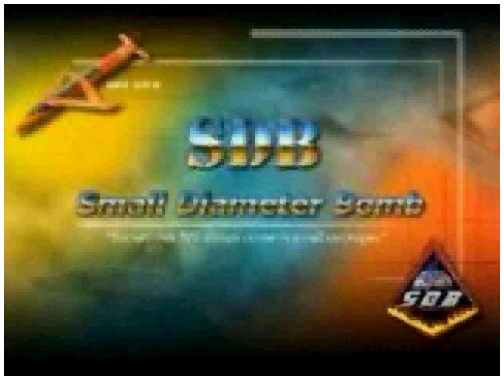
- Challenges
  - JSF cockpit moving map (Defining digital map support)
  - Ensure JMPS integrated with future GEOINT
  - Limited on board space for NGA support data, partnering with programs to develop registration/data storage to support targeting
    - Unknown requirement for fidelity of high resolution elevation data, ongoing testing with Level II DTED (SRTM) and DPPDB
  - F/A-22 SAR standards
  - Accessing NTISR data to make available via National System for Geospatial Intelligence (NSG)

Future Munitions

- Small Diameter Bomb (SDB)
  - First in family of miniature munitions
  - Minimize collateral damage, engage multiple targets per sortie
  - DPPDB is source of precise coordinates (accuracy)
  - NGA teaming with OSD DOT&E to support live tests
  - USAF submitted SDB accuracy requirement Apr 05



- Challenges
  - Maintain or improve accuracy, currency, and coverage of DPPDB holdings supporting GPS/INS seeking wpns
    - Ensure programs understand capability & limitations
  - Target characterization (4m wpn vs 20m knowledge)
    - GEOINT foundation for target system analysis
  - Teaming with USAF to define future accuracy reqt



Takeaways

- GEOINT is critical to effectiveness of future DoD warfare systems
  - Targeting, navigation, mission planning, situational awareness

- NGA is committed to fully supporting Future Warfare Systems!
- Must continue to engage early in process
  - JCIDS (FCB), IIPTs, Service Labs, etc.
- Encouraging specified vs implied requirem
  - DRAFT JP 3312.01

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Know the Earth…Show the Way

NGA Organization

STAFF Offices

Director
Deputy Director
Executives

Military | Business | Technical | Western

LINE Directorates

ENABLER Directorates

Human Development | Financial Management | Security & Installations

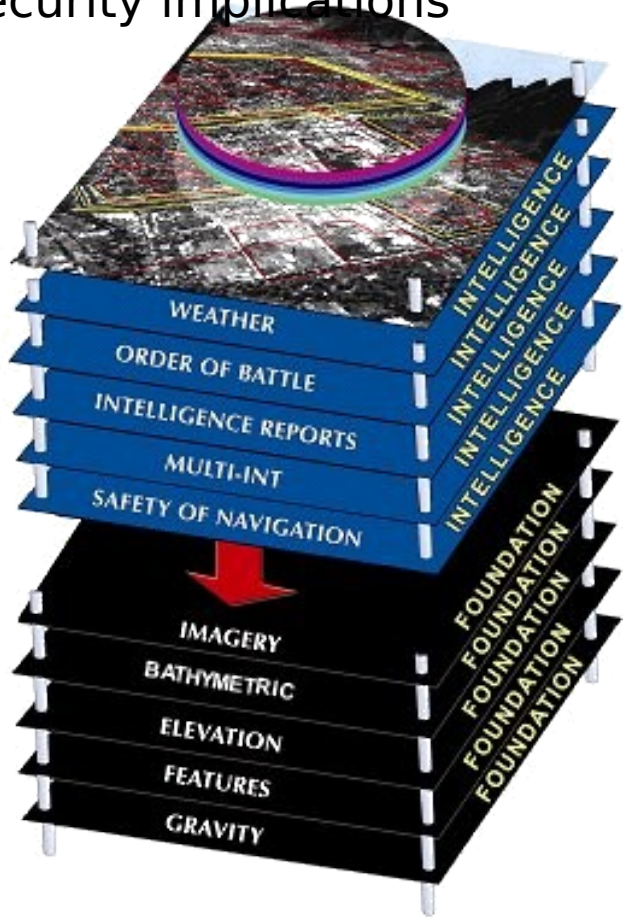
Supporting Transformation

- **DoD's and NGA's Transformations: Our Mutual Objectives**
  - **Our Nation's military is transforming how it fights - new threats, new capabilities, and new operational concepts**
  - **Those changes are driving NGA to change**
  - **We understand where the Department is going and are transforming to meet our Geospatial Intelligence need**
- **Discovering and understanding the needs of and future warfare systems is a full time job**
  - **Evolving systems' needs for geospatial intelligence are substantial and require DoD-wide scrutiny**
  - **NNGA's role in supporting defense acquisition**
- **The process is costly and requires:**
  - **Close cooperation among Commands, Services, and Agencies**
  - **Recognition that this is a DoD-wide interest**

Global | Info Superiority | Aerospace Superiority | Precision Engagement | Agile Combat Support | Dominant Maneuver

What is GEOINT and Why is it Important?

Definition: Information about any object - natural or man-made - that can be observed or referenced to the earth, and has national security implications



- Where am I?
- Where are the Friendlies?
- Where are the Enemies?
- Where are the Non-Combatants?
- How do I move or navigate among them?
- What is the Environment?
- What does it mean?
- What is the impact?

How is NGA Transforming?

Trends transforming NGA